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AUTHOR Barclay, James R.; And Others
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ABSTRACT

The purpose of this study is to report a behavioral observation validation of a multiple social interaction measurement instrument entitled the "Barclay Classroom Climate Inventory." This instrument measures social interaction in the elementary classroom as derived from self-report, peer judgments and teacher expectations. It provides an integrated need assessment system for use in diagnostic planning of curricular and behavioral interventions. In this study, an effort was made to relate psychometric variables to actual observed behavior in a number of classrooms of the Corpus Christi Public Schools over a ten-day period, with 700 elementary children as subjects of observation. (Author)

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Behavioral and Achievement Correlates of Social Interaction
Variables in the Elementary Classroom

James R. Barclay University of Kentucky
William E. Stilwell University of Kentucky
David A. Santoro Cleveland State University
Charles M. Clark Corpus Christi Public Schools

The purpose of this study is to report a behavioral observation validation of a multiple social interaction measurement instrument entitled: the Barclay Classroom Climate Inventory. This instrument measures social interaction in the elementary classroom as derived from self-report, peer judgments and teacher expectations. It provides an integrated need assessment system for use in diagnostic planning of curricular and behavioral interventions. In this study an effort was made to relate psychometric variables to actual observed behavior in a number of classrooms of the Corpus Christi Public Schools over a ten day period with 700 elementary children as subjects of observation.

Review of the Literature

One of the characteristics of modern educational research is an effort to be more precise in the delineation of what actual behaviors attend and covary with learning achievement in the classroom. From an earlier concern with deviation in test scores, identification of global problems etc., educational researchers are attempting to focus more specifically on personal and social behaviors which accompany maladaptive or disruptive behavior in classroom learning. A promising approach to this problem has been found in the development of empirically derived behavior ratings. Though Medley and Mitzel (1963) have defined some of the problems of teacher ratings and teacher observed behavior, these ratings are chiefly concerned with the teacher himself and do not account for the multiple network that involves peers and self reactions.

Another promising approach to the evaluation of classroom behavior has been undertaken by behavioral researchers who have focused on the actual observed behavior of children. For example, Montgomery(1969) reported the results of multiple behavioral observations in the classroom as related to attending, passive and disruptive behavior. Base-line observations could then be related to teacher reinforcement contingencies and outcomes. In two studies relating to

the outcomes of an NDEA Institute for School Psychologists and Special Education Teachers, it was observed that behavioral observations of children and teachers provided information for making decisions about both behavioral strategies and curriculum interventions (Barclay, Montgomery and Barclay, 1971; Brown, Montgomery and Barclay, 1969). It was learned in the first of these studies that such behavioral observations played a large role in determining the specific teacher-psychologist strategies to be employed with 220 educationally handicapped children. As a consequence of the planned interventions these children gained considerably in their ability to be task-oriented, and in pre-post gains on the Wide-Range Achievement Test. This occurred over a four week period in one summer. In the second study, observations were made regarding the reinforcement relationship of psychologist to teacher and then to children. The psychologist in this particular class noted that teachers attended to a given individual only when he was out of his seat, and did not attend or reinforce the child for in-seat behavior. He developed a paradigm involving systematic reinforcement of teachers for reinforcing the child in his in-seat behavior. The results of this study indicate that it is entirely possible and in fact necessary to instruct teachers how to reinforce the appropriate behavior.

More recently, Cobb (1969, 1970) observed a number of elementary school children utilizing a behavioral observation scale that included: attention, talk to teacher and peer of a positive nature, volunteering, initiating behavior, compliance, self-stimulating, play, non-compliance, looking around, non-attending and inappropriate teacher and peer talk categories. The interesting facet of his studies is related to a series of step-wise regressions which he accomplished using the behavior observations as predictors against the Stanford Achievement Test. He found that for arithmetic sub-tests the behavioral categories, attention and talk-to-peer positive were among the first five predictors in every analysis. Final multiple R's ranged from .60 to .72. For reading and spelling subtests talk-to-peer positive

and self-stimulation were categories which appeared consistently among the first five predictors. The range for multiple R's was .56 to .72. When the California Test of Mental Maturity as an intelligence test factor was added into the step-wise regressions it contributed 43 to 66 per cent of the variance with sex and SES each contributing a maximum of 2 per cent. The behavioral categories then provided an additional 9 to 19 per cent of the total variance accounted for. Similar findings were in evidence from step-wise regressions with reading and spelling sub-tests wherein intelligence and these other variables were present. Cobb's final analysis of multiple correlations indicated multiple Rs ranging from .72 to .89 with various reading, spelling and arithmetic tests. Total variance accounted for between predictors and criterion variables ranged from a low of 53 per cent to a high of 80 per cent. These findings are most impressive in demonstrating the amount of variance in achievement variable accounted for by behavioral observations.

Impressive as the behavioral observation studies are, it is most unlikely that the profession will be able to train enough individuals to do the behavioral analysis needed in educational practice. It is therefore important to determine whether it is possible to obtain multiple psychometric data which will in effect do the same service for education. The writers have been engaged in the development of an instrument which is designed to do just this. The instrument is called the Barclay Classroom Climate Inventory (hereafter referred to as the BCCI). This instrument was constructed to meet the needs of school personnel for early identification of children in planning learning strategies. It is based on an approach to individual differences which would allow and favor prescriptive teaching directly related to the needs of individuals concerned and utilizing their strengths and interests as a primary vehicle for such planning. The BCCI is a unique instrument which measures the classroom climate by evaluating self, group and teacher expectations. It is unique in the sense that it identifies problems or needs in a classroom as a derived by-product of self, peer and teacher inputs. Further, a computer scores and prints out

a report in non-psychological language that can be used by school personnel. A manual interprets the coding system of the BCCI, identifies problems and needs, and provides an index for alternate strategies that can be designed around the child, to the child, with the child and for the child.

The BCCI has been administered to nearly 7000 children in 12 states over a period of seven years. It is applicable to third through sixth graders, is not timed, can be read to children who cannot read well, and takes a little over one hour to administer. The BCCI provides an accurate and reliable index of classroom social interaction, serving as a basis for individual conferences with students and teachers, in-service teacher education, team-teaching procedures, parental consultation, and the experimental evaluation of either individual counselor or teacher learning team interventions.

The BCCI is based on research related to self-concept studies, sociometry, vocational development theory and social learning principles. Basically, the research findings which support its construction and use are:

- ° that self-concept is derived from what a child can do and how he or she is treated, i.e., a child's physical and social skills are most important in the determination of his self-concept;
- ° that group choices related to personal and social skills are reliable and valid indicators of the expectations which children have for each other;
- ° that teacher judgments about children reveal their impressions of the child and their expectations for his learning performance and/or behavior;
- ° that a primary motivator of children's learning or behavior in school is their judgment of the world of work and the expectations that they have for the future;
- ° that the development of adequate interpersonal social relations and task-oriented skills constitute a major set of "survival" skills for children if they are to maximize their individual potential for learning.

A number of studies have been undertaken with the BCCI. Most of these are reported in a research manual (Barclay, 1970) and in a users' manual (1971). The instrument has been found to be stable

and reliable over a year's period or more, to possess internal consistency, to be related to a number of the other measures of self-report and peer judgments as well as to other tests of personality and creativity, to discriminate between reticent and disruptive children, and to account for considerable differential patterns of social reinforcement and interaction as related to the occupation of the father. In addition, a number of experimental studies have been undertaken relating to the use of the BCCI as a pre-post measure of change. A study with four fifth grade classrooms using one of the earlier forms of the instrument was reported in 1967 (Barclay, 1967). In this study two school psychologists working in a classroom as teacher aides devised specific strategies for target individuals on the basis of the BCCI pre-test. A number of significant changes occurred as a result of this study and effort. Another study which is unpublished as yet, but will be re-analyzed in accordance with the aptitude-treatment-interaction paradigm is one done by Brown for her master's thesis (Brown, 1967; Stilwell, Brown & Barclay in preparation, 1971). In this study with a group of fifth graders Brown used three alternative treatments related to a pre-test of the BCCI. These treatments were re-assignment according to peer choices in certain activities, a group counseling experience, and a placebo group in which vocational information was discussed. Some significant differences occurred on analysis of variance chiefly related to the vocational information group ! Another study nearing completion is by Church (1971) in which group counseling and individual counseling were used as experimental treatments focusing on vocational information and feedback from the printouts to children directly. Using the aptitude-treatment-interaction paradigm some very significant results were obtained for children showing disruptive behavior or passive and reticent behavior.

Thus the BCCI is a diagnostic classroom instrument based on skill identification and social interaction in a number of areas relating to realistic-outdoor skills, intellectual-artistic skills, social-conventional and enterprising skills. It contains a self-competency component, a vocational awareness component, a section relating to reinforcing interests, and includes peer judgments

in all of these areas. In addition, it also taps teacher expectations. In all, there are 31 short scales which are independent of each other. They are integrated by a computer process to provide a multiple input assessment of classroom needs focusing both on the individual and the group. Thus the instrumentation as such provides an independent need assessment which is not simply based on self-report, but involves peers and teacher judgments at the same time.

This present study addresses itself to several very important questions. If the BCCI does provide a multiple need assessment system, then what are the relationships found between the BCCI variables and actual multiple observations of behavior in the classroom? What are the behavioral correlates of these psychometric dimensions? Secondly, the study reported here asks the question: how much of the variance between intelligence and achievement can be obtained when social interaction variables are added to intelligence as a predictor of traditional achievement test results? Finally, this study is interested in learning how much variance can be understood when intelligence, social interaction variables and behavioral observations are all used as predictors against traditional achievement test scores.

Method

In the fall of 1970 the BCCI was administered to 1400 fourth, fifth and sixth grade students enrolled in the Corpus Christi School District. Complete analyses and printouts were obtained on each of these children plus group reports for each classroom. Six schools were tested located in the following socioeconomic areas: white upper-middle, white middle, Mexican-American low, and black low. In February, 1971 behavioral observations were obtained in four of the six schools on 710 elementary school children. Two instruments were used for behavioral observations. The first instrument focused on three categories of behavior: (1) attending behavior which was interpreted as physical or verbal responses which are task-oriented (e.g. looking at the talking teacher or peer, reading an assigned text, or following teacher instructions); (2) non-attending behavior described as physical or verbal responses

which are not task-oriented (e.g., looking around the room or out the window, stimulating himself by swinging his feet or scratching, or not responding to teacher's questions or comments); and (3) disruptive behavior described as gross motor, noise making or aggressive activities (e.g., kneeling in a chair, rattling papers, whistling, coughing or verbal behavior of a disruptive nature).

A second rating form included a number of specific categories which were related to: (1) the number of times the student raised his hand, (2) the number of times he was called on by the teacher, (3) the number of times whispering to peers, (4) the number of times talking back to the teacher, (5) the number of times answering without being called on, (6) the number of times observed to put his head on the desk, (7) the number of times observed playing with pencils or other materials, (8) the number of times he turned his back on the teacher, (9) the number of times he stood up at his desk, and (10) the number of times observed squirming, fidgeting and otherwise manifesting nervous reactions.

These two forms were used consecutively by the observers. Form 1 was used in a ten second interval observation in which the observer simply coded one of the three behaviors for each child in the class observing each one for three separate ten second intervals. In other words the observer watched child 1 for 10 seconds recording his activity, then went on to child 2 etc. Afterwards the observer repeated this process for the entire number of children two additional times. Form 2 was used by the observer focusing on four children at a time and observing their behavior over a two minute period. This was done once each day.

Six substitute teachers all women were employed for ten days to obtain these observations. Observer training included (1) a brief presentation on the nature of the problem and their expected behaviors; (2) several video-taped presentations in which they were trained to observe the specified behaviors, and (3) reliability checks on the six observers using first the video taped presentations and subsequently checks in the classrooms using two sets of observers on the same children. Initial reliability indices between observers on the video taped presentations

ranged from .82 to .95. A mid-study reliability check was completed with the R ranging between .91 and .96 for various pairs of observers.

On completion of the data analysis it was observed that many students had few observations in a consistent manner. This was due to absences, changes of schedules and in some instances illness by the observers. An inspection of the data revealed that there were three or more observations on 227 male students and 210 female students. This group was then considered the target for this study.

The following data analyses were then completed on the University of Kentucky computer: (1) intercorrelations between behavioral observations and BCCI variables; (2) step-wise regressions using the behavioral observations on attending, non-attending and disruptive behavior as the dependent variable and the BCCI variables as independent variables; (3) step-wise regressions using Stanford Achievement Test scores as the dependent variables with the BCCI variables and California Test of Mental Maturity Intelligence scores as independent variables; and (4) a step-wise regression for a limited sample of males in which BCCI data, CTMM scores and behavioral observations were used as independent variables against the prediction of Stanford Achievement Test scores as dependent variables.

Results^{*}

Tables 1 and 2 presented some selected correlations between behavioral observations used in the second form and the BCCI variables.

--- insert tables 1 & 2 about here----

These tables indicate that there are a number of significant correlations between the behavioral observations obtained by the six observers and the BCCI variables. It is relevant to provide an interpretation of these correlations.

^{*} It may be helpful to the reader to consult Figure 1 that explains in summary form the variables included in the BCCI.

Female Intercorrelations

In table 1 it is possible to make these interpretative statements about the correlations obtained. For example, with regard to item # 24 (frequency of raising hand behavior) girls who raised their hands a number of times in response to teacher queries tend not to be seen by their peers as reticent and shy, are not interested in outdoor, manual, conventional or business-oriented occupations, and are seen by teachers in their ratings as unstable extroverts. Girls who are often called on by teachers (item # 25) tend to be viewed by their peers as manipulative, striving for leadership, and disruptive. The girls themselves show low scores in outdoor and physical skills occupations, typically intellectual-scientific, social and business occupations, but do show an interest in occupations which are stereotypic masculine in nature. They are also seen by teachers as unstable extroverts. Item #28 (the frequency of answering without being called on) is significantly related to preference for masculine occupations and ratings by teachers regarding unstable extroverted behavior. Girls who were observed playing with pencils, paper, books etc. on a number of occasions (item # 30) tend to rate themselves high on self artistic-intellectual skills, are seen by the peer group as more disruptive, are interested in conventional and clerical occupations and are viewed by teachers more often as unstable extroverts. Girls who frequently turn their back on teachers tend to have higher scores on self outdoor-physical skills and self enterprising leadership expectations (item # 31) Girls who were observed standing up at their seat on a frequent basis (item #32) are not viewed by their peers as possessing intellectual-artistic, outdoor-physical or social-conventional skills. They are seen by the peer group as very disruptive of classroom activities. Finally, girls who are observed frequently to be squirming around and fidgeting tend to be viewed by their peers as possessing artistic-intellectual, social-conventional and enterprising-leadership skills. They are also seen by at least some of their peers as disruptive.

Male Intercorrelations

Students who were observed raising their hand many times (item # 24) tend to view themselves as high on social-conventional skills, and are seen by their peer group as possessing many realistic-outdoor, physical and social-conventional skills. They are not interested in artistic occupations and tend not to be seen by teachers as unstable in their behavior. Boys who are called on often by teachers tend to view themselves as above average on self-enterprising and leadership skills (item # 25). Boys who were observed to be whispering to peers very often (item # 26) tend not to see themselves as enterprising and leaders, but are in point of fact viewed by the peer group as manipulating and disruptive in the classroom. Boys who are observed in class talking back to the teacher (item # 27) tend to view themselves as possessing social and leadership skills, are interested in physical skill and outdoor occupations as well as social occupations calling for interpersonal skills. They are viewed by teachers as unstable individuals and not viewed as predictable and dependable in the classroom. Boys who frequently answer without being called on in the classroom (item # 28) tend to view themselves as possessing many intellectual-artistic skills and are seen by the group as possessing artistic-intellectual skills as well as group leadership skills. They are typically less interested in outdoor-manual and physical skill occupations and show a preference for occupations which require a mature and calculated degree of risk-taking. Teachers tend to view them as unstable introverts or extroverts. Boys who frequently stand up at their seats (item # 32) are seen as very similar to the preceding pattern. They also have a higher view of their artistic-intellectual skills, are seen by the group as enterprising and disruptive, but also viewed as reticent. They show an elevated interest in status occupations and are seen by teachers as unstable extroverts.

These behavioral correlations with the BCCI variables provide relevant validating information supportive of the contention that the BCCI provides a multiple-measurement source of identifying needs in a given classroom. Many of the correlations between the behavioral observations and BCCI variables are not significant, but those that are significant are especially relevant to the multiple sets of measurements. In other words, self, peer, and teacher judgments tend to fit into a configuration with vocational awareness that suggests a convergence on a set of basic need systems. The fact that the observers were unaware of the details of the system or the particular psychometric characteristics of individuals or groups suggests still further the psychometric validation of the need assessment system based on multiple data converging into a cluster pattern.

The second analysis of data involved an intercorrelation matrix for the behavioral observations for form 2 the selves. Tables 3 and 4 provide information as to how the behavioral observations correlated with each other.

--- insert tables 3 & 4 here ----

There are some interesting observations to be made regarding these intercorrelations. For boys the number of times hands were raised is positively correlated with the number of times called upon, and is negatively correlated with playing around with pencils etc. Thus, one is lead to conclude that the best way to get called on is to raise one's hand. If children are raising their hand, presumably they are attending, and not fooling around. Logically also the frequency of whispering to peers is related significantly to playing with pencils, turning one's back on the teacher, standing up at the desk and generally squirming and fidgeting around. For girls, the number of times hands were raised is also related to the number of times called on , but is also significantly related to playing around with pencils etc. The number of times called on seems to be significantly related in girls to playing around with pencils and general squirming and fidgeting. Whispering for girls appears to be positively related to standing up at the desk and fidgeting.

After the correlations were obtained for the second set of behavioral observations a further data analysis was desired relating to the category classification system of the BCCI. From earlier studies and empirical observation as well as factor analytic studies, it is apparent that children as adults tend to distribute themselves by some combination of hereditary and acquired set of responses into five major categories: (1) extroverted-divergent, (2) extroverted-convergent, (3) introverted-divergent, (4) introverted-convergent, and what may be termed for lack of a better name (5) blend. The results of the scoring protocols and the computer integration demonstrate that in virtually every class there are individuals who fall into these categories. The extroverted individual tends to be more susceptible to external reinforcement and appears to have a locus of control that is more external than internal. The introverted individual often appears to be self-motivated, to be able to act without continued social reinforcement and to manifest deviant and creative skills. In addition, these two major groups tend to differ in the stability of their behavior. Some are quite stable and predictable and others are not. Though the BCCI did not originally espouse Eysenck and Rachman's point of view (1965) on this matter, and indeed was not constructed on a theory consistent with this framework, the results of many data analyses overwhelmingly confirm the existence of such a constellation of characteristics.

To further validate the category system of the BCCI, it was determined to perform a multivariate analysis of the BCCI variables together with the ten behavioral observations and to include the attending category from the first set of behavioral observations. It was not possible to enter the passive and non-attending and disruptive categories at the same time since the classification scheme for evaluating behavior in the first set of observations was not independent. That is to say that a child in the first behavioral rating system had to be rated either attending, non-attending or disruptive. These same rubrics did not apply to the second set of behavioral observations already discussed.

Using a multivariate analysis program designed by Dr. Jeremy Finn of the University of New York at Buffalo, the data for the males and females were analyzed using the five classification systems of the BCCI. It should be noted here that it was already known that real differences existed between the BCCI variables due to the classification system itself. However, it was not known whether the behaviors observed would in fact support the classification scheme. As a consequence the univariate F ratios obtained from this program were of real interest. Still further, it was a logical question of concern to the authors to determine whether the multivariate differences obtained using the BCCI variables alone would be further delineated by the inclusion of behavioral data from the two observation systems.

--- insert table 5 about here ----

Table 5 provides the multivariate F ratios obtained for the analysis of BCCI data by classification scheme for temperament and includes the attending behavior variable from the first set of ratings and the ten behaviors specified in the second set of ratings. An inspection of the univariate F ratios for each of the categories of the classification system provides some confirmation of the category classification system. For example,¹ girls classified as extroverted-divergent raise their hands more often (3.63**), but are called on less (3.37**) and are more prone to stand up at their desk (6.74***) and squirm around (2.87*). Boys who are classified as extroverted-divergent are more prone to answer without being called on (5.85***) and tend less to put their heads down on the desk (4.87**). These behaviors would tend to indicate a rather uncontrolled and unstable response system in the class appropriate to the classification scheme.

Girls who are classified as extroverted-convergent are seen both as less attending (11.84 ***) and as raising their hands frequently (11.16***). However they also appear to be squirming around and fidgeting more often also (2.99*).

¹Confidence levels of F ratios * .10 level, ** .05, *** .01

Boys classified as extroverted-convergent are observed to be called on more often (3.07 *), less often turning their backs on teachers (3.76**) and less often fidgeting around (4.87**). Girls classified as introverted-divergent appear to attend more often (3.01*) and to raise their hands less often (3.48*). Boys classified as introverted-divergent are less likely to put their head on their desk (5.83***), less likely to turn their back on the teacher (3.05*) and less often observed squirming and fidgeting (3.31*). Girls classified as introverted-convergent are more prone to put their heads on their desk (3.31*) and boys in this classification are less likely to put their head on their desk (4.17**).

These descriptive analyses suggest that there are some behavioral characteristics consonant with the classification scheme that support it.

The next step in the data analysis was to complete some step-wise regressions using the behavioral observations of the first rating as the dependent variable. In these analyses passive-non-attending, attending, and disruptive behavior were used as the dependent variables and the BCCI plus behavioral data were used as independent variables. Tables 6-11 present the results of these analyses.

---insert tables 6-11 about here ---

Tables 6 and 7 report the step-wise regressions for passive and non-attending behavior. Girls who score highly on this behavioral dimension tend not to be viewed as melancholic (introverted-divergent), do not see themselves as enterprising leaders, and are observed as playing with pencils and putting their heads on the desks. They do not raise their hand and are not called on. Boys who are passive and non-attending tend to do much whispering, have a high self estimate of their outdoor and physical skills, are seen by teachers as introverted-divergent and fidget around. Multiple correlations for these two groups reach .379 for girls and .412 for boys

Tables 8 and 9 report the same step-wise regression procedures using attending behavior as the dependent variable. Here one observes that attending behavior for females is not related to squirming and restless activities, or whispering, playing with pencils, or talking back to the teacher. The girl who attends is viewed by the teacher as stable and predictable in her behavior. She is seen by her peers as somewhat reticent and retiring. A similar profile appears for males. They do not whisper, do not fidget, do not raise their hand and are called on. They are viewed as compliant by teachers. The picture emerging from these descriptions for attending children is one of quiet, docile, compliant individuals who conform to teacher expectations and are not seen by peers as individuals who "rock the boat." Multiple correlations with the dependent variable in these two analyses reach .515 for females and .467 for males.

Tables 10 and 11 report the same step-wise regressions for observed disruptive behavior as the dependent variable. Here one observes just about the reverse of the attending correlations. For girls whispering, fidgeting, talking back to the teacher predict disruptive behavior. Teachers do not see this girl as a stable predictable child, nor do the peers view her as possessing leadership potential. She tends to view herself, however, as a leadership person. For males standing up at the seat, and fidgeting are also predictors of disruptive behavior. These boys do not raise their hand, are not interested in a number of the vocational occupations relating to artistic, enterprising conventional or typically masculine occupations, and are not viewed by the group as enterprising and leader types. Multiple correlations for these regressions reach .551 for girls and .364 for boys.

As was expected these step-wise regressions do not account for a considerable portion of the variance, in themselves. Generally, they account for about 20 per cent of the total variance ranging from a low of 14 percent to 30 per cent.

The next step in the data analysis was to use the BCCI variables together with the CTMM intelligence scores in a step-wise regression to predict academic achievement on the Stanford Achievement arithmetic and reading achievement scores. A limited sample of the Corpus Christi students had complete scores on all of the variables. The sample finally obtained was then limited to 114 4th through 6th grade boys and 50 fourth-sixth grade girls. Step-wise regressions were then completed on this sample using the BCCI variables (including the new behavioral reinforcer section not included in earlier data analysis because it had not been administered to the entire Corpus Christi group).

--- insert tables 12-15 about here ---

When the BCCI and intelligence are used as independent variables to predict various achievement scores the multiple correlations range from .59 for arithmetic achievement for boys to .89 for arithmetic achievement for girls. Boys who achieve well in arithmetic appear to be viewed by teachers as stable introverts, are seen by the group as enterprising and leaders, have a higher I.Q., are less interested in vocational artistic occupations, and appear to be most susceptible to peer female reinforcers. Girls who do well in arithmetic are viewed by their peers as possessing outdoor-masculine and intellectual skills, tend to have a high I.Q., are not interested in occupations calling for low-risk or status, are less interested in peer female reinforcers and more interested in peer male reinforcers. Thus, for arithmetic achievement some basic stereotypic thinking is being reinforced. Boys who are high in arithmetic achievement tend to be controlled task-oriented leaders. Girls who do well tend to be masculine in skills and interests.

For reading achievement boys who do well in reading achievement tend to have a high I.Q. are seen by their peers as artistic-intellectual view themselves as artistic-intellectual, but do not see themselves possessing considerable realistic-masculine and outdoor skills. They are viewed by teachers as stable introverts, appear to be reinforced by intellectual task-oriented and paternal social reinforcers.

Girls who do well in reading tend to have a high I.Q., to be seen by their peers as possessing outdoor-physical skills and not to be seen as disruptive. Once again, these girls seem to be less reinforced by peer female influences and more by peer male groups.

The final analysis of this study was to complete a step-wise regression on the arithmetic and reading achievement scores using I.Q., the BCCI variables and the behavioral observations. Unfortunately, a thorough search of the data yielded only 46 males for this analysis. It would have been more convincing and helpful to have been able to find a larger sample. Nonetheless, utilizing these independent variables the step-wise regressions were obtained.

---- insert table 16 & 17 about here ---

These two analyses for male students alone indicate that intelligence, selected BCCI variables and observed behavior all provide predictors of arithmetic and reading achievement. Boys who achieve well in reading tend to have a high I.Q., are not seen by the group of peers as reticent, do play with pencils and are observed as disruptive, are not interested in outdoor-manual occupations, tend to be viewed by teachers as stable-introverts, and are seen by their peers as leader types. This supports Cobbs' contention that peer talk is important in both reading and arithmetic achievement(1970). It also suggests that possibly some of these boys are quite bored with the class situation.

In arithmetic achievement boys who do well tend to have a higher I.Q. to be seen by the group as somewhat reticent. They do not appear to attend as much as others nor do they raise their hand and volunteer. They do not talk back to the teacher.

With the inclusion of the behavioral data the multiple correlations for this group of boys reaches .823 for reading and .837 for arithmetic achievement. This accounts for 67 and 70 per cent of the variance respectively.

Though the inclusion of the behavioral observations increase the total prediction of the dependent variable somewhat and are interesting observations relating to quality of the multiple R relationship, it should be noted that the multiple correlation without behavioral data reaches .742 as against .823 with the behavioral data. The amount of variance accounted for without behavioral data is 55 per cent as against 67 per cent with the behavioral data. This suggests that for reading achievement the BCCI obtains results that substantively add to intelligence (adding approximately 35 per cent more variance accounted for).

For arithmetic achievement the multiple R without behavioral data reaches .592 as against .837 with behavioral data. The amount of variance accounted for without behavioral data is 35 per cent as against 70 per cent with behavioral data. Behavioral observation seems more important in reading.

Naturally, these comparisons suggest that the best and optimum set of predictors for standardized achievement tests would be a combination of intelligence, BCCI social interaction variables and observational data. However, there are some limitations to the last step-wise regressions using the behavioral input. First of all the size of the sample was quite small for the number of predictors utilized. It therefore should be replicated with a larger sample. Secondly, the socioeconomic and racial factors were not considered in the step-wise regressions. It was generally known that the sample obtained was middle to low socioeconomic status and that anglo, black and Mexican groups were included. This was more balanced in the earlier studies with behavioral observations, but less balanced with the narrowing sample available for the step-wise regressions.

Even so, it would appear that the use of the BCCI as a measure of social interaction relating positively to achievement scores has been demonstrated. Moreover, in view of the real difficulty attending the use of behavioral observations

on a large scale, it would appear that intelligence and the BCCI scores will provide a multiple correlation with achievement that is most helpful to diagnostic planning in the specific school system.

Discussion & Summary

This study has reported a number of research efforts to ascertain the behavioral characteristics of a multi-method multi-input psychometric instrument that assesses the needs of a classroom situation. The chain of studies and the logic dictating the selection of one method over another has been detailed, not as something clearly revealed from on high, but rather as it happened, i.e. in a series of logical steps that emerged, rather than were intuitively known from the beginning. It is evidenced by the research that it is possible to utilize multiple self-report, peer judgment and teacher expectation inputs to arrive at a cumulative synthesis of the need assessment learning of performance deficits existing in a given environment. Clearly the assessment of what are the needs is not just an individual self-report matter, nor does it rest exclusively with teacher judgment or peer nominations. But if one takes together the various inputs obtained from these sources it is possible to arrive at an assessment of that classroom climate which is objective (insofar as any perceptions may be objective) and integrated.

The study also demonstrates with some degree of confidence that there are observable behavioral concomitants to psychometric dimensions. It suggests that the bi-polar category system of the BCCI into extroversion-introversion, stable-unstable quadrants has some validity as defined in behavioral observations. Finally, it suggests that the BCCI does account for a portion of variance at least equal to, and in some instances exceeding that of intelligence in the prediction of academic achievement as measured by achievement tests. These observations should provide an exciting new entry into relevant diagnostic planning for educational learning teams.

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Table 1

Selected Intercorrelations between Behavioral Observations
and BCCI Variables for 210 Female Students

BCCI Variables	Behavioral Observations									
	24	25	26	27	28	29	30	31	32	33
1. SAI							.12			
2. SRM								.12		
3. SSC										
4. SE								.11		
5. GAI									-.16*	.10
6. GRM									-.14*	
7. GSC									-.11	.14*
8. GE			.13*							.13*
9. GR	-.13*									
10. GD		.14*					.12		.14*	.13*
11. REAL	-.11	-.15*								
12. INT		-.11								
13. SOC		-.15*								
14. CONV	-.11						.10			
15. ENT	-.12	-.13*	.12							
16. ARTS						-.13*				
17. CONT										
18. MF		.13*			.14*					
19. ST		-.11								
20. MEL										
21. CHL	.13*	.10			.15*		.19**			
22. PHL										
23. SAN										

N= 210 Note: correlations normalized and obtained from step-wise regressions.

P > .05 = .13; .01 = .18

24 = frequency of raising hand
25 = frequency of called on
26 = frequency of whispering
27 = frequency of talking back to teacher
28 = frequency of answering without being called on

29 = frequency of putting head on desk
30 = frequency of playing with pencil: paper, books etc.
31 = frequency of turning back on teacher
32 = frequency of standing up at seat
33 = frequency of squirming and fidgeting

Table 2

Selected Intercorrelations between Behavioral Observations
and BCCI Variables for 227 Male Students

BCCI Variables	Behavioral Observations									
	24	25	26	27	28	29	30	31	32	33
1. SAI					.13*			.10	.12	
2. SRM										
3. SSC	.13*			.12						
4. SE		.12	-.11	.12						
5. GAI					.13*					
6. GRM	.14*									
7. GSC	.20**						-.11	-.11		
8. GE			.16*		.12				.32**	.19**
9. GR									.12	
10. GD			.19**						.33**	.16*
11. REAL				.16*	-.12					
12. INT										-.12
13. SOC				.19**						
14. CONV										
15. ENT										
16. ARTS	-.11									
17. CONT					.12					
18. MF										
19. ST									.16*	
20. MEL	-.12			.17*	.10					
21. CHL	-.12			.21**	.21**				.14*	
22. PHL				-.11						
23. SAN				-.13*		-.11				

N = 227 Note: correlations normalized and obtained from step-wise regressions.

P > .05 = .13; .01 = .18 (.05 */ .01**)

24 = frequency of raising hand
25 = frequency of called on
26 = frequency of whispering
27 = frequency of talking back to teacher
28 = frequency of answering without being called on

29 = frequency of putting head on desk
30 = frequency of playing with pencils paper, books etc.
31 = frequency of turning back on teacher
32 = frequency of standing up at seat
33 = frequency of squirming and fidgeting

Table 3
Intercorrelations Behavioral Observations
344 Elementary School Males

No.	Mean	S.D.	1	2	3	4	5	6	7	8	9	10
1.	.183	.454		581**	009	-.033	084	030	-.126*	-.033	-.052	-.015
2.	.067	.202			019	-.009	011	-.004	-.084	-.011	-.056	059
3.	.260	.473				075	033	-.046	207**	124*	271**	325**
4.	.007	.085					-.013	-.025	-.029	-.020	175**	-.024
5.	.007	.079						-.018	122*	-.029	014	253**
6.	.042	.105							-.030	-.004	-.010	090
7.	.081	.245								-.038	019	168**
8.	.009	.108									205**	060
9.	.075	.223										112
10	.155	.356										

P .05 .113; .01 .148 Decimals for correlations omitted.

Table 4
Intercorrelations Behavioral Observations
351 Elementary School Females

No.	Mean	S.D.	1	2	3	4	5	6	7	8	9	10
1.	.190	.350		505**	-.026	-.032	088	-.002	126*	-.002	038	043
2.	.079	.167			043	-.018	042	-.020	260**	007	034	136*
3.	.321	.485				072	167**	-.043	039	-.045	163**	222**
4.	.002	.057					-.009	-.020	-.022	-.006	-.032	-.036
5.	.030	.176						-.033	076	-.003	143*	318**
6.	.028	.117							005	354**	-.042	057
7.	.064	.188								-.001	064	322**
8.	.008	.071									172**	166**
9.	.068	.162										316**
10.	.138	.279										

P .05 .113; .01 .148 Decimals for correlations omitted.

- | | |
|---|--|
| <p>*
1. = no. of times raised hand
2. = no. of times called on
3. = no. of times whispering
4. = talking back to teacher
5. = answering without being called on</p> | <p>6. putting head on desk.
7. playing with pencils etc.
8. turning back on teacher
9. standing up at desk
10. squirming & fidgeting at desk</p> |
|---|--|

Table 5

Multivariate Analysis of BCCI and Behavioral
Observation Data by Temperament Classification

Classification	Females			Males		
	Mult. F	P	N	Mult. F	P	N
Extroverted Divergent	3.25	.0001	38	1.91	.0035	17
Extroverted Convergent	5.63	.0001	82	4.91	.0001	38
Introverted Divergent	1.66	.0161	10	2.68	.0001	12
Introverted Convergent	2.26	.0003	28	2.94	.0001	28
Blend	---	-----	71	---	----	113

Df for females 35 & 190

Df for males 35 & 169

Note: Blend group included in grand mean but not analyzed

Table 6

Step-Wise Regression Observed Passive and Non-Attending
Behavior Female Students

Variable	Simple r	Multiple r	r^2	Increase in r^2	F	P
Melancholic	-.187	.187	.035		8.26	.01
Playing with pencils etc.	.153	.234	.055	.020	4.80	.05
Self-Enterprising	-.148	.273	.072	.017	4.27	.05
Putting head on desk	.135	.300	.090	.018	4.30	.05
Self-Real	.069	.324	.105	.015	3.81	.05
Sanguine	.177	.343	.118	.003	3.10	
Called on	-.084	.353	.125	.007	1.93	
Raised Hand	-.055	.368	.136	.011	2.80	
Croup Real	.064	.379	.144	.008	1.88	
df 1 & 229						

Table 7

Step-Wise Regression Observed Passive and Non-Attending
Behavior Male Students

Variable	Simple r	Multiple r	r^2	Increase in r^2	F	P
Whispering to peers	.236	.236	.055		12.19	.01
Self-Real	.192	.303	.092	.037	8.30	.01
Melancholic	.153	.339	.115	.023	5.22	.05
Voc. Real	.100	.356	.127	.012	2.95	
Squirming & fidgeting	.124	.370	.137	.010	2.31	
Self-Artistic Int.	.035	.383	.147	.010	2.35	
Voc. Intellectual	.122	.393	.155	.008	1.75	
Voc. MF	-.010	.402	.162	.007	1.83	
Talking back to teacher	.146	.412	.170	.008	1.90	
df 1 & 208						

Table 8
Step-Wise Regression Observed Attending Behavior
Female Students

Variable	Simple r	Multiple r	r^2	Increase in r^2	F	P
Squirming & fidgeting	-.299	.299	.089		22.33	.01
Sanguine	.232	.380	.145	.056	14.86	.01
Talking back to teacher	-.164	.419	.176	.031	8.47	.01
Whispering to peers	-.225	.444	.198	.022	6.03	.05
Playing with pencils etc.	-.217	.467	.219	.021	6.08	.05
Group Reticence	.145	.479	.230	.011	3.23	
Self-Real	-.067	.487	.238	.008	2.29	
Group Enterprising	.040	.494	.245	.007	2.11	
Choleric	-.020	.500	.251	.006	1.60	
Voc. Enterprising	.037	.506	.257	.006	1.91	
Called on	.089	.515	.266	.009	2.45	

df 1 & 229

Table 9
Step-Wise Regression Observed Attending Behavior
Male Students

Variable	Simple r	Multiple r	r^2	Increase in r^2	F	P
Whispering to peers	-.282	.282	.079		17.89	.01
Squirming & fidgeting	-.259	.319	.102	.023	6.99	.01
Melancholic	-.161	.354	.126	.024	5.56	.05
Voc. Real	-.119	.383	.147	.021	5.09	.05
Raised Hand	.153	.391	.164	.017	4.10	.05
Self-Real	.071	.419	.176	.012	2.81	
Standing up at seat	-.189	.430	.185	.009	2.21	
Group Disruptive	-.289	.442	.196	.011	2.82	
Voc. Artistic	-.051	.450	.203	.007	1.61	
Called on	.026	.457	.209	.006	1.52	
Voc. Status	-.014	.462	.214	.005	1.22	
Answering without being called on	.034	.467	.219	.005	1.20	

df 1 & 208

Table 10

Step-Wise Regression Observed Disruptive Behavior
Female Students

Variable	Simple r	Multiple r	r^2	Increase in r^2	F	P
Whispering to peers	.379	.379	.144		38.30	.01
Squirming & fidgeting	.300	.428	.184	.040	11.15	.01
Talking back to teacher	.166	.462	.214	.030	8.43	.01
Sanguine	-.153	.489	.240	.026	7.88	.01
Group Enterprising	-.063	.506	.257	.017	5.03	.05
Self-Enterprising	.057	.521	.272	.015	4.50	.05
Voc. Status	-.142	.534	.286	.014	4.30	.05
Choleric	.032	.541	.293	.007	2.31	
Voc. Artistic	-.054	.545	.298	.005	1.55	
Voc. Conventional	.012	.551	.304	.006	1.78	

df 1 & 229

Table 11

Step-Wise Regression Observed Disruptive Behavior
Male Students

Variable	Simple r	Multiple r	r^2	Increase in r^2	F	P
Standing up at seat	.201	.201	.040		8.75	.01
Raising hand	-.131	.240	.058	.018	3.76	
Squirming & fidgeting	.166	.272	.074	.016	3.63	
Voc. Artistic	-.051	.281	.079	.005	1.07	
Voc. Enterprising	-.065	.308	.095	.016	3.59	
Voc. Conventional	-.050	.317	.101	.006	1.43	
Voc. MF	-.032	.330	.109	.008	1.58	
Group Enterprising	-.016	.350	.123	.014	3.19	
Melancholic	.057	.357	.128	.005	1.19	
Sanguine	.038	.364	.133	.005	1.10	

df 1 & 208

Table 12

Step-Wise Regression using BCCI & Intelligence
 Arithmetic Achievement(4th,5th & 6th Grade Boys) N=114

Step	Variable	Multiple r	r ²	Increase in r ²	F	P
1.	PHL	.382	.146		19.18	.01
2.	GE	.452	.205	.059	8.27	.01
3.	I.Q.	.500	.251	.046	6.77	.05
4.	VOC ART	.530	.281	.030	4.51	.05
5.	Peer Reinforcers- Male	.556	.310	.029	4.58	.05
6.	Peer Reinforcers Female	.572	.328	.018	2.90	
7.	Conventional Reinforcers	.338	.338	.010	1.51	
8.	Self-Stimulating- Reinforcers	.592	.351	.013	2.10	

P(1&114) .05= 3.94; .01=6.90

Table 13

Step-Wise Regression using BCCI & Intelligence
 Arithmetic Achievement(4th,5th,6th Grade Girls) N=50

Step	Variable	Multiple r	r ²	Increase in r ²	F	P
1.	GRM	.678	.460		41.02	.01
2.	I.Q.	.744	.555	.095	9.97	.01
3.	Peer Reinforcers- Female	.793	.630	.075	9.38	.01
4.	VOC CNT	-.817	.669	.039	5.22	.05
5.	GAI	.832	.693	.024	3.54	
6.	VOC STATUS	-.844	.714	.021	3.07	
7.	Self-Stimulating- Reinforcers	.857	.735	.021	3.32	
8.	Peer Reinforcers Male	.884	.783	.048	9.11	.01
9.	VOC.CONV	-.890	.793	.010	1.94	

Table 14

Step-Wise Regression using BCCI & Intelligence
Reading Achievement(4th,5th,6th Grade Boys)N=114

Step	Variable	Multiple r	r ²	Increase in r ²	F	P
1.	I.Q.	.456	.208		29.59	.01
2.	GAI	.583	.341	.133	22.30	.01
3.	SRM	-.632	.400	.059	10.78	.01
4.	PHL	.661	.437	.037	7.32	.01
5.	VOC MF	-.681	.465	.026	5.49	.05
6.	SAI	.697	.487	.022	4.65	.05
7.	VOC STATUS	-.712	.507	.020	4.34	.05
8.	Conventional Reinforcers	.722	.522	.015	3.30	
9.	VOC ENT	.730	.533	.011	2.43	
10.	Intellectual Task-Oriented Reinforcers	.736	.543	.010	2.25	
11.	Paternal Social Reinforcers	.742	.552	.009	2.05	

P(1&114) .05= 3.94; .01=6.90

Table 15

Step-Wise Regression using BCCI & Intelligence
Reading Achievement(4th,5th,6th Grade Girls)N=50

1.	I.Q.	.716	.513		50.71	.01
2.	GRM	.782	.613	.100	12.16	.01
3.	Peer Reinforcers Female	-.811	.658	.045	6.09	.05
4.	VOC CONV	-.827	.685	.027	3.76	
5.	PHL	-.842	.710	.025	3.91	
6.	Paternal Social Reinforcers	-.853	.728	.018	2.76	
7.	Peer Reinforcers Male	.863	.746	.018	3.07	
8.	GD	-.870	.758	.012	1.99	

P(1&50) .05= 4.03; .01= 7.17

Table 16

Step-Wise Regression Reading Achievement
Male Students

Variable	Simple r	Multiple r	r^2	Increase in F r^2	P
I.Q.	.413	.413	.171	9.30	.01
Group Reticence	-.261	.512	.263	.092	.05
Playing with pencils etc.	.186	.571	.327	.064	.05
Voc. Real	-.296	.641	.412	.085	.05
Observed Disruptive Beh.	.374	.684	.469	.057	.05
Group Enterprising	.064	.723	.524	.055	.05
Melancholic	-.219	.748	.561	.037	3.31
Self-Enterprising	-.335	.771	.595	.034	3.17
Phlegmatic	.101	.788	.622	.027	2.61
Voc. Conventional	-.295	.801	.642	.020	2.00
Group Artistic-Int-	.043	.811	.659	.017	1.75
Self-Social	.249	.823	.678	.019	2.05

df = 1 & 46

Table 17

Step-Wise Regression Arithmetic Achievement
Male Students

Variable	Simple r	Multiple r	r^2	Increase in F r^2	P
I.Q.	.555	.555	.308	20.08	.01
Voc. Social	-.447	.616	.380	.072	5.07
Group Reticence	.042	.679	.462	.082	6.57
Raised Hand	-.362	.715	.512	.050	4.31
Played with pencils etc.	.101	.758	.575	.063	6.04
Talked back to teacher	-.137	.782	.612	.037	3.91
Group Enterprising	.108	.804	.667	.035	3.79
Voc. Status	-.427	.821	.675	.028	3.27
Attending	-.304	.837	.701	.026	3.19

df 1 & 46

Figure 1
A Summary Explanation of BCCI Code Variables

Variable Code	Explanation
SAI Self Artistic-Intellectual	- Relates to skills such as collecting books, taking music lessons, etc.
SRM Self Realistic-Masculine	- Relates to skills such as outdoor manual ones, building things, motor ski
SSC Self Social-Conventional	- Represents skills used in inter-personal relations.
SE Self Enterprising	- Relates to desired or actual leadership ability and high need achievement.
GAI Group Artistic-Intellectual- (Sociometric)	- A cluster of items relating to artistic and intellectual skills.
GRM Group Realistic-Masculine (Sociometric)	- A cluster of items relating to outdoor manual and physical skills.
GSC Group Social-Conventional (Sociometric)	- A cluster of items relating to inter-personal skills and sociability.
GE Group Enterprising (Sociometric)	- A cluster of items relating to originality, leadership skills.
GR Group Reticence (Sociometric)	- A cluster of items relating to shy, withdrawn and passive behavior.
GD Group Disruptiveness (Sociometric)	- A cluster of items relating to disruptive, noisy and aggressive action
REAL Vocational Realistic	- A list of occupations relating to outdoor and manual skills.
INT Vocational Intellectual	- A list of occupations relating to intellectual and scientific skills.
SOC Vocational Social	- A list of occupations relating to social and affiliation skills.
CONV Vocational Conventional	- A list of occupations relating to conventional and clerical skills.
ENT Vocational Enterprising	- A list of occupations relating to enterprising and money making skills.
ART Vocational Artistic	- A list of occupations relating to artistic and creative skills.
CONT Vocational Control	- A list of occupations relating to high control and "safe" occupations.
MF Vocational Male-Female	- A list of occupations (scored differently for boys and girls) reflecting typical stereotyped choices.
ST Vocational Status	- A list of occupations denoting high social prestige.
MEL Teacher Rating Melancholic Dimension	- A list of adjectives related to unstable and introverted behavior.
CHL Teacher Rating Choleric Dimension	- A list of adjectives related to unstable and extroverted behavior.
PHL Teacher Rating Phlegmatic Dimension	- A list of adjectives related to stable introverted behavior.
SAN Teacher Rating Sanguine Dimension	- A list of adjectives related to stable extroverted behavior.

Figure 1 (Continued)
A Summary Explanation of BCCI Code Variables

Variable Code	Explanation
SSR Self-Stimulating Interests	- A list of reinforcers relating to self-stimulating and bizarre activities.
ESR Esthetic Interests	- A list of reinforcers relating to esthetic activities.
ITR Intellectual Task-Oriented Interests	- A list of reinforcers relating to teacher praise and achievement behavior.
FRR Family Reinforcers	- A list of reinforcers relating to activities shared with parents and other family members.
CNV Conventional Interests-	A list of reinforcers related to money, candy, pop etc.
PRM Peer Male Reinforcers	- A list of reinforcing activities related to the male peer group.
PRF Peer Female Reinforcers-	A list of reinforcing activities related to the female peer group.
CCI Class Climate Index	- A list of activities and feelings concerned with school satisfaction.